

**Florida Trawl Gear Characterization**  
Prepared by Fish and Wildlife Research Institute  
Florida Fish and Wildlife Conservation Commission

### 3.1 Trawls

In state waters of Florida, a trawl or trawl net is defined as a net in the form of an elongated bag with the mouth kept open by various means and fished by being towed or dragged on the bottom. Trawl nets are usually constructed of nylon or polyethylene twine. Mesh sizes vary depending on size and design, which affects the height and width dimensions of the net opening as well as how the trawl performs along the sea bed. Mesh size is generally smaller in the cod end, which reduces net expansion and concentrates the shrimp. There are three primary sub-gear types in this category: otter trawl, skimmer trawl, and the roller frame trawl.

#### 3.1.1 Otter Trawl

The otter trawl is a towed conical net with the mouth kept open by means of boards or wooden doors on each side of the opening (appendix 4-1). Recent survey data (2005; A. McMillen-Jackson, personal communication) indicate that the net length for otter trawls ranges in size from 16 to 98 feet, and mesh sizes range from 3/4 to 2" for the body of the net, and 5/8 to 3/4" for the cod end, depending on the regulatory area. According to the gear survey data, 66% of respondents indicated that a try net was used in conjunction with an otter trawl. Try nets, used for testing areas for shrimp concentrations, may have a headrope length of 10 to 20 feet and a leading edge perimeter of 30 to 60 feet, depending on the regulatory area.

#### 3.1.2 Skimmer Trawl

The skimmer trawl has a rigid "L"-shaped or triangular metal frame with the inboard portion of the frame attached to the vessel and the outboard portion attached to a skid that runs along the seabed (appendix 4-2). The net mesh size for skimmer trawls ranges from 3/4-1 1/2" stretched mesh in the body of the net, and 5/8 to 1 1/3" for the tail bags. Survey data (A. McMillen-Jackson, personal communication) indicated net length ranged from 25 to 72 feet.

#### 3.1.3 Roller Frame

The roller frame trawl has a rectangular rigid frame, usually metal, to keep the mouth of the net open (appendix 4-3). The interior of the frame contains a grid of vertical bars shielding the net opening, while the bottom of the frame has rollers which allow the apparatus to roll over the seabed. The beam length of the frame is not more than 16 feet and the vertical bars in the frame are no more than 3 inches apart. Mesh size ranges from 3/4 to 7/8 inches for the body of the net, and 5/8 to 3/4 for the cod end. According to the survey data (A. McMillen-Jackson, personal communication), net length for roller frame trawls ranged from 20 to 94 feet.

## Gear Deployments

### 4.1 Trawls

Trawl vessels in state waters typically use from 1-4 trawl nets, depending on the regulatory area, which may include the use of a try net. State regulations specify that no more than two nets may be aboard any vessel, including a try net, and each net must be no more than 500 square feet in area when fishing from shore to 3 nautical miles out on the Gulf coast of Florida. State waters in the Gulf extend to 9 nautical miles.

#### 4.1.1 Otter Trawl

Otter trawls use wooden doors on each side of the net mouth to keep the net open when it is being towed (appendix 4-1). The top margin of the net uses a floated headrope, while a tickler chain on the bottom margin of the mouth drags along the sea floor and startles shrimp or fish into the net. As the net moves forward, the catch is forced farther back until trapped into the tail bag, or cod end of the net. Inside three nautical miles, vessels use a one or two net configuration. A single net may be towed from the stern of the vessel, where a double net would have each net attached to an outrigger from the port and starboard beam. Vessels fishing in waters outside 3 nautical miles may also use a quad rig which consists of two nets on each outrigger with a center sled in between the paired nets. According to a recent survey (A. McMillen-Jackson, personal communication) of the shrimp fishery in both state and federal waters of Florida, depths fished ranged from 10 feet to greater than fifty feet, with the majority of trips occurring in deeper water (table 1).

Table 1. Number of trips by trawl type and depth category from a survey (A. McMillen-Jackson, personal communication) of the Florida shrimp fishery.

Trawl Type	Depth Range (feet)			
	0-10	11-25	26-50	51+
Trips				
Otter	9	49	35	103
Skimmer	6	1	0	1
Roller	40	38	5	1

#### 4.1.2 Skimmer Trawl

Skimmer trawls are primarily used in inshore waters of the Gulf, usually in less than 10 feet of water. The mouth or perimeter of the net is hung from the outer edges of the triangular frame and, as it is towed, is kept open with a weight that holds the inboard corner of the net mouth on the bottom (appendix 4-2). The 113-kg weight, which is tied to an inboard line, spreads open the bottom of the net, and a tickler chain is connected between the weight and the outer skid. As in the otter trawl, the action of the tickler

chain forces shrimp into the net, and as the net moves forward, the catch becomes trapped in the cod end.

#### 4.1.3 Roller Frame

Roller frame trawls, which usually fish in waters less than 25 feet, utilize a rectangular frame construction with vertical bars in the area of the frame (appendix 4-3). As the trawl is towed, the frame keeps the net open as it rides along the bottom on metal rollers. Because of the spacing on the vertical bars, larger animals are deflected away from the net and only small shrimp, invertebrates, and fish are captured.

Table 2. Average number of trips per year by gear type and depth category, 2000-2004.

Gear Type	Depth Category (feet)										
	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	>100
Bandit Rig	21.4	8.8	4.2	9.8	2.6	1.6	1.2	4.8	2.6	3	11.2
Beach/Haul Seine	4277.6	239	17.4	11.2	1.2	0.2	0	0	0	0	0
Blue Crab Trap	19095.2	4847	346.6	24	2	0.8	0.2	0	0	0	0.2
Bully Net	173.6	7.8	27.4	0.6	0.4	0	0	0	0	0	0
Cast Net	14367	1538.4	774.4	122.2	6.6	1	0.8	0.4	0	0.4	0
Dredge	149	26.6	0.8	0.8	0.8	0	0	0	0	0	0
Fish Trap	391.8	154.6	200.2	45.2	27.6	0.4	1.2	2.4	0.4	0	1.2
Gig	862.2	27.4	38.2	26	4.2	3.2	0.4	0.2	0.2	0	0.4
Hand Gear	130	735	29.2	7.4	1.2	3	16.4	4	0.8	0.2	0
Rod & Reel	2124.8	1450.2	923.8	651.4	335.2	202.4	274.4	285.2	51.8	12.4	28.6
Lampara Net	0	0.6	19.8	3.4	0.4	0	0	0	0	0	0
Lobster Trap	252.2	799.6	1023.2	855	515.4	229.8	221.6	185	35.4	3.8	1.8
Purse Seine	115.2	60.2	46.2	60.6	8.8	78.2	17.8	0.2	0	0	0
SCUBA	496.6	755.8	964.8	202.6	33.2	10.8	5.8	4.2	0	0.2	0.6
Snorkel	418.4	36.8	4.8	3	0.2	0	0	0	0	0	0
Sponge Hook	269.6	23.2	5.8	7	0.2	0	0	0	0	0	0
Stone Crab Trap	1383.2	5517.8	4466	2005.2	404.6	23	9	1.4	0.2	0	0
Oyster Tongs	17981	16.4	1.4	0	0	0	0	0	0	0	0
Trap, Uncl.	37.4	51.2	10.4	4.4	0.2	0.2	0	0.2	0.2	0	0
Trawls	7520.4	6673.6	974	148.8	52	39	27.8	144.4	7.8	1.4	1.6
Roller Frame	2378.8	715.8	0.4	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0

## 5.0 Target Species

### 5.1 Trawls

In Florida waters of the Gulf of Mexico, trawl fishing gears target primarily shrimp. Otter trawls and skimmer trawls catch most of the food shrimp, whereas roller frame trawls primarily target bait shrimp. A small trawl fishery in Northwest Florida targets some bait and offshore bottom finfish species such as Spanish sardines, scad, and ladyfish.

## 6.2 Active Vessel Gears

The number of commercial fishing licenses actively fishing with a particular gear type in Florida's state waters of the Gulf of Mexico is shown by calendar year in table 5. The major gear types used by license holders are cast net, rod & reel, stone crab, blue crab and lobster traps, as well as trawls and oyster tongs. The number of participants using these gear types was relatively consistent from 2000 through 2004. The number of fishing licenses using cast nets averaged highest over the 5-year period at 1,227 licenses. This was followed by rod and reel, stone crab traps, trawls, blue crab traps, oyster tongs, and lobster traps at 1,159, 859, 627, 502, and 340 licenses, respectively, from 2000 through 2004. Near shore beach or haul seine gears are also used by about 297 licenses on average.

Table 5. Number of active licenses in Florida state waters of the Gulf of Mexico, by year and gear type (FWC/FWRI Trip Tickets).

License Type	2000			2001			Year 2002			2003			2004	
	Individual	Vessel	Total	Individual	Vessel	Total	Individual	Vessel	Total	Individual	Vessel	Total	Individual	Vessel
Gear Type														
Bandit Rig	17	44	61	20	20	40	16	34	50	28	34	62	28	39
Beach/Haul Seine	187	115	302	184	101	285	179	124	303	219	98	317	181	96
Bully Net (Lobster)	15	13	28	13	12	25	16	13	29	18	12	30	21	30
Cast Net	826	473	1299	830	446	1276	842	427	1269	769	408	1177	727	389
Dredge	1	2	3	0	4	4	0	3	3	2	1	3	1	2
Gig/spear	77	33	110	86	37	123	97	31	128	90	44	134	107	49
Hand Gears	38	26	64	33	18	51	23	22	45	114	32	146	140	38
Lampara Net	1	1	2	1	2	3	1	1	2	0	1	1	0	0
Oyster Tongs	538	34	572	590	39	629	470	22	492	442	24	466	336	17
Purse Seine	34	37	71	36	29	65	15	26	41	19	19	38	7	14
Rod & Reel	737	690	1427	668	583	1251	549	489	1038	570	502	1072	523	482
Scuba	107	149	256	96	161	257	95	171	266	112	185	297	57	179
Snorkel	20	21	41	17	18	35	20	18	38	10	19	29	15	32
Sponge Hook	43	26	69	69	27	96	60	20	80	68	22	90	64	29
Trap, Blue Crab	363	270	633	351	254	605	317	256	573	328	263	591	323	277
Trap, Fish	36	67	103	38	50	88	31	49	80	35	38	73	33	33
Trap, Lobster	130	229	359	131	189	320	130	249	379	124	211	335	99	206
Trap, Stone Crab	476	560	1036	402	471	873	392	476	868	351	423	774	338	408
Trap, uncl.	22	31	53	35	45	80	18	22	40	20	27	47	25	27
Trawl, uncl.	217	544	761	233	526	759	160	482	642	121	382	503	112	357
Trawl, Roller Frame	9	37	46	9	40	49	8	44	52	7	49	56	5	49

## 7.0 Effort

Five-year averages from 2000 through 2004 indicated that more trips reporting the use of blue crab traps were recorded than any other gear type (24,628 trips; figure 2). This was followed by cast nets (17,097), oyster tongs (19,074), stone crab traps (13,894), and food shrimp trawls (15,991). A significant number of rod & reel trips (6,495) and beach or haul seine trips (4,577) were reported as well. Effort by gear and area indicate that blue crab traps are used primarily between Ft. Myers and Apalachicola, while oyster tongs are limited to the Apalachicola region as this is the primary harvesting area for oysters (figures 2 and 3). The bulk of cast net trips occurred from the Ft. Myers to Crystal River fishing zones, while trips where shrimp trawls are used occurred from the Ft. Myers zone through the Panama City zone with a large spike of activity (particularly for bait shrimp with roller frame trawls) in the Crystal River zone. Trips where stone crab traps are used have a fairly wide distribution from the Key West zone to the southern end of the Apalachicola zone, while trips with lobster traps are primarily in the Key West and Tortugas fishing zones.

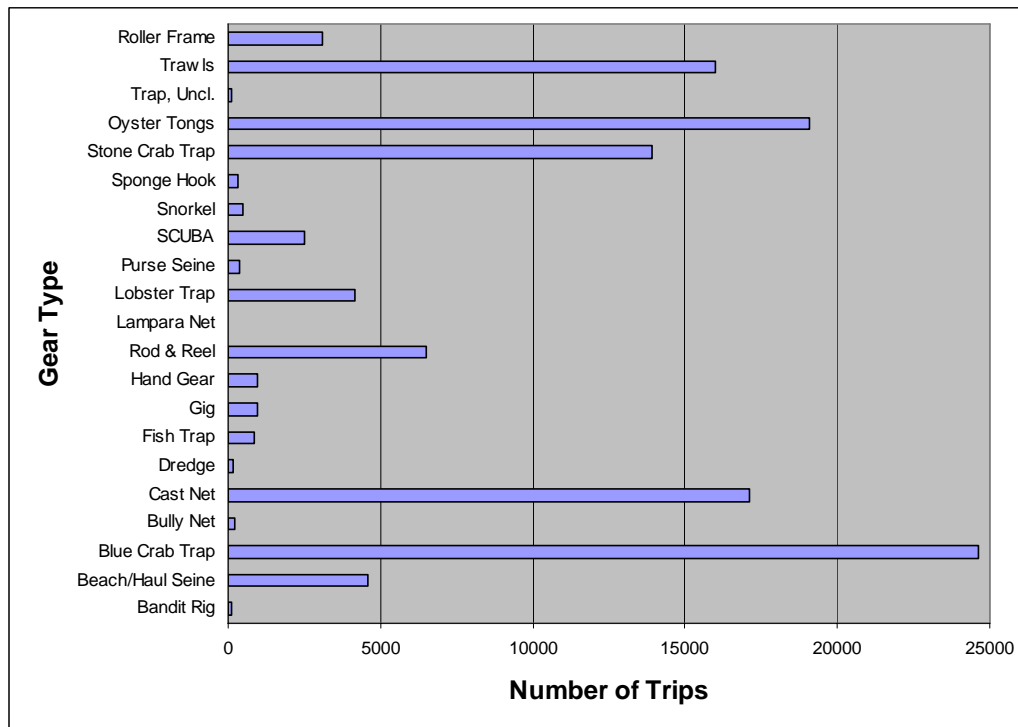


Figure 2. Average number of fishing trips by gear type from 2000-2004.

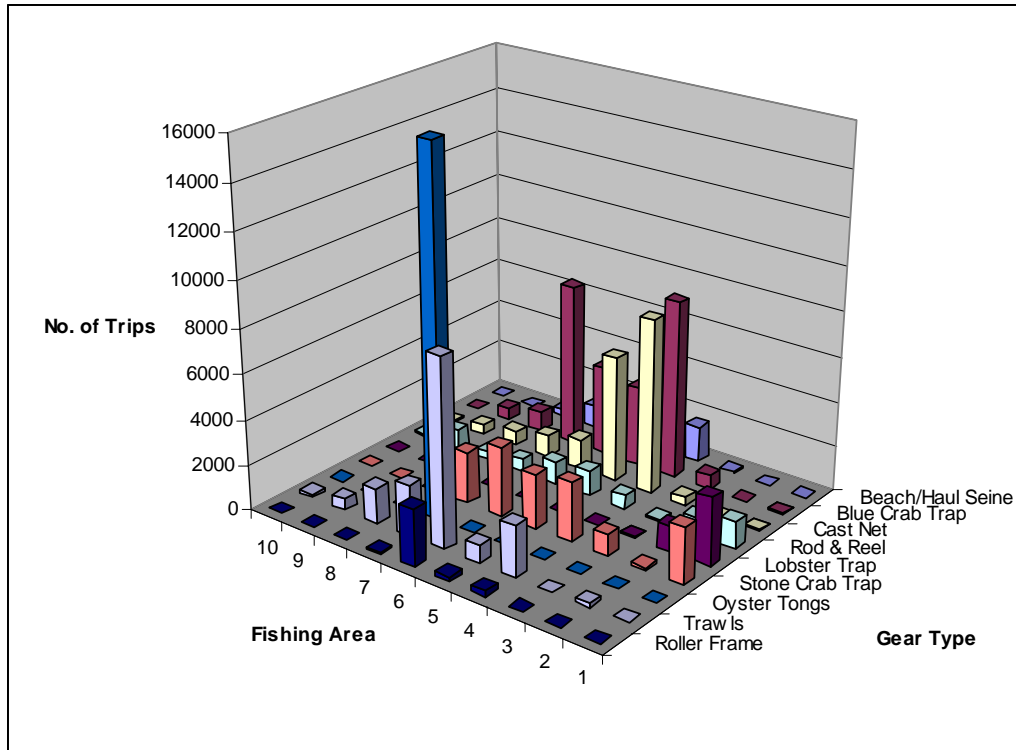


Figure 3. Average number of fishing trips by gear type and fishing area, 2000-2004.

The number of trips by month indicates that most gear types are fished year round (figure 4) with the exception of the lobster and stone crab fisheries which have regulatory seasons (Aug. 6- March 30, and Oct. 16 – May 15, respectively). Both of these fisheries experience significant activity at the beginning of the season which tapers off later in the season. In the blue crab fishery, there is more activity in the late spring and early summer months, while cast net trips increase during the winter roe mullet fishery. Trips for oysters decrease during the warmer months of summer and early fall, as do trips in the food shrimp trawl fishery.

Depths along the state-federal regulatory boundary range from 15 feet in waters off the Big Bend region (Apalachicola to Crystal River) to approximately 90 feet of water off the Western panhandle. Boundary waters can be as deep as 26 fathoms off the Dry Tortugas. The number of trips by gear and month shows the majority of trips occur in fairly shallow water with some gears like lobster and stone crab traps extending to deeper water (figure 5). Trips where haul seines, blue crab traps, oyster tongs, otter and skimmer trawls, and roller frame trawls occurred almost exclusively in waters less than 20 feet. The majority of lobster trap and rod & reel trips occurred in waters as deep as 80 feet while those for stone crab traps were in waters less than 60 feet.

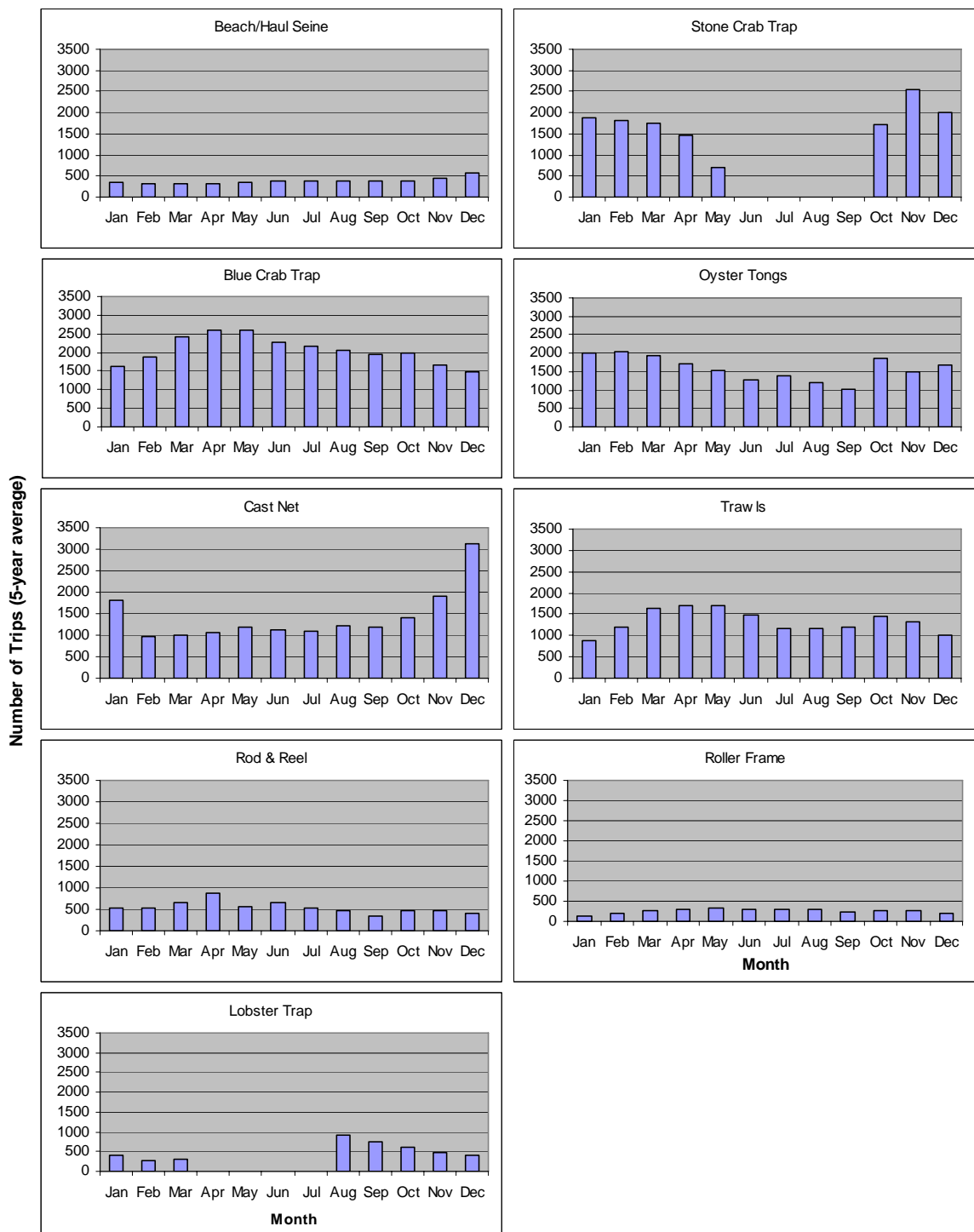


Figure 4. Average number of fishing trips by gear type and month. Averages are calculated over a 5-year period from 2000-2004.

Analysis of time fished data shows that over the 5-year period from 2000-2004, trips where otter or skimmer trawls were used averaged a total of 72,184 hours annually (figure 6). This was followed by rod & reel gears at 43,763 hours, blue crab traps at 34,493 hours, oyster tongs at 29,045 hours, stone crab traps at 25,408 hours, lobster traps at 20,594 hours, and cast net trips at 16,750 hours per year. Trips where time fished was reported in days were converted to hours.

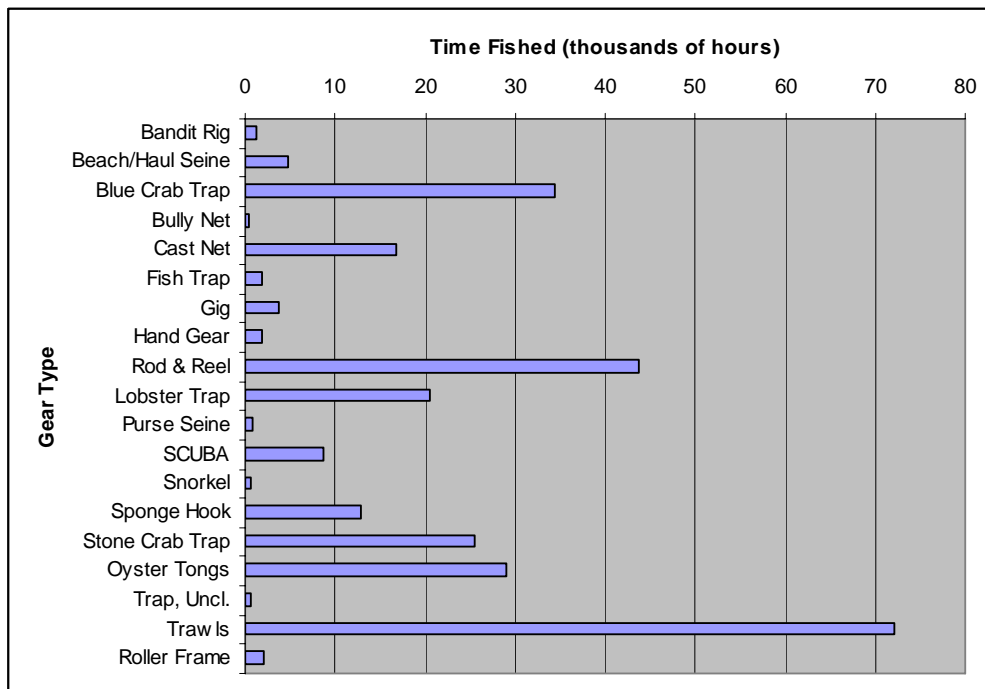


Figure 6. Average amount of time spent fishing per year by gear type from 2000-2004.



In trawl fisheries, tow times indicated that for food shrimp, otter trawls averaged between 2.7 and 4.4 hours per tow from survey zones in the Gulf, while skimmer trawls averaged from 3 to 7.5 hours per tow (tables 6 and 7). Roller frames, which are more prominent in the bait shrimp fishery, averaged from .2 to .5 hours per tow.

Table 6. Average trawl tow times, by zone, from a survey (A. McMillen-Jackson, personal communication) of the Florida shrimp fishery.

Food Shrimp	Otter Trawl				Rollerframe				Skimmer trawl			
	Average	Min	Max	n	Average	Min	Max	n	Average	Min	Max	n
Zone 1	1.8	1	3	10								
Zone 2									7.5	6	9	2
Zone 3	4.4	2.8	6	2								
Zone 4	2.9	0.8	6	32								
Zone 5					1	1	1	1	3	3	3	1
Zone 6	2.7	1	5	25	3.4	3.4	3.4	1				
Bait Shrimp	Otter Trawl				Rollerframe				Skimmer trawl			
	Average	Min	Max	n	Average	Min	Max	n	Average	Min	Max	n
Zone 1	0.5	0.5	0.5	1								
Zone 2					0.4	0.3	0.5	3				
Zone 3												
Zone 4					0.3	0.2	0.5	4				
Zone 5					0.5	0.5	0.5	1	0.5	0.5	0.5	1
Zone 6	1	1	1	1	0.2	0.03	0.3	2				
Food and Bait	Otter Trawl				Rollerframe				Skimmer trawl			
	Average	Min	Max	n	Average	Min	Max	n	Average	Min	Max	n
Zone 1	0.5	0.5	0.5	1								

Table 7. Geographic zones from a survey (A. McMillen-Jackson, personal communication) of the Florida shrimp fishery.

Zones	Counties	Geographic region
1	Nassau to Brevard	Northeast
2	Indian River to Dade	Southeast
3	Dade to Monroe	The Keys
4	Collier to Pinellas	Southwest
5	Pasco to Wakulla	Big Bend
6	Franklin to Escambia	Panhandle

## **8.0 Status of Fisheries**

In 2004, trawl, trap, hook and line, cast net, and haul seine fisheries accounted for 80% of commercial fishing trips in Florida's state waters of the Gulf of Mexico. Since 2000, the number of trips by trawl gears for food shrimp dropped 31% from 18,684 trips in 2000, to 12,877 trips in 2004 (figure 7, table 8). The rise in amounts of imported shrimp in recent years, increased fuel costs, and hurricane-related impacts (particularly in 2005) on shrimping has likely contributed to this decline. By contrast, trips by roller frame increased from 2,416 trips in 2000 to 3,991 trips in 2004. For trap fisheries, blue crab trips were fairly consistent from 2000-2004, averaging around 25,000 trips per year. The number of lobster trips has fluctuated during that period from a low of 2,898 trips in 2001 to 4,918 trips in 2003. The number of lobster trips in 2004 was 4,467. Stone crab trips have gradually declined from 16,011 trips in 2000 to 12,899 trips in 2004. While historical data indicates that harvests of both the stone crab and lobster fisheries can be cyclical in nature, the implementation of trap reduction plans in these fisheries and an increased number of tropical storms and hurricanes have likely contributed to a decline in the number of trips in recent years.

The number of trips by beach or haul seine gears increased by 80% from 3,734 trips in 2000 to 6,731 trips in 2004 (figure 7, table 8). While seines target a variety of inshore species, the largest increase in use has been in the winter roe striped mullet fishery where they are used in conjunction with cast nets. On the other hand, the number of cast net trips has gradually decreased from 19,263 in 2000 to 14,459 trips in 2004. The primary target species of cast nets are striped (black) mullet, but 2003 and 2004 have seen the lowest mullet landings since 1996 which was the first full year after the ban on inshore entangling nets in Florida's state waters. (probably as a result of market conditions) Commercial hook and line activity in Gulf state waters initially decreased by 34% from 2000 to 2002, increased in 2003, then dropped back down in 2004. Hook and line activity may fluctuate between state and federal waters due to changes in market conditions, and fish movement and abundance.

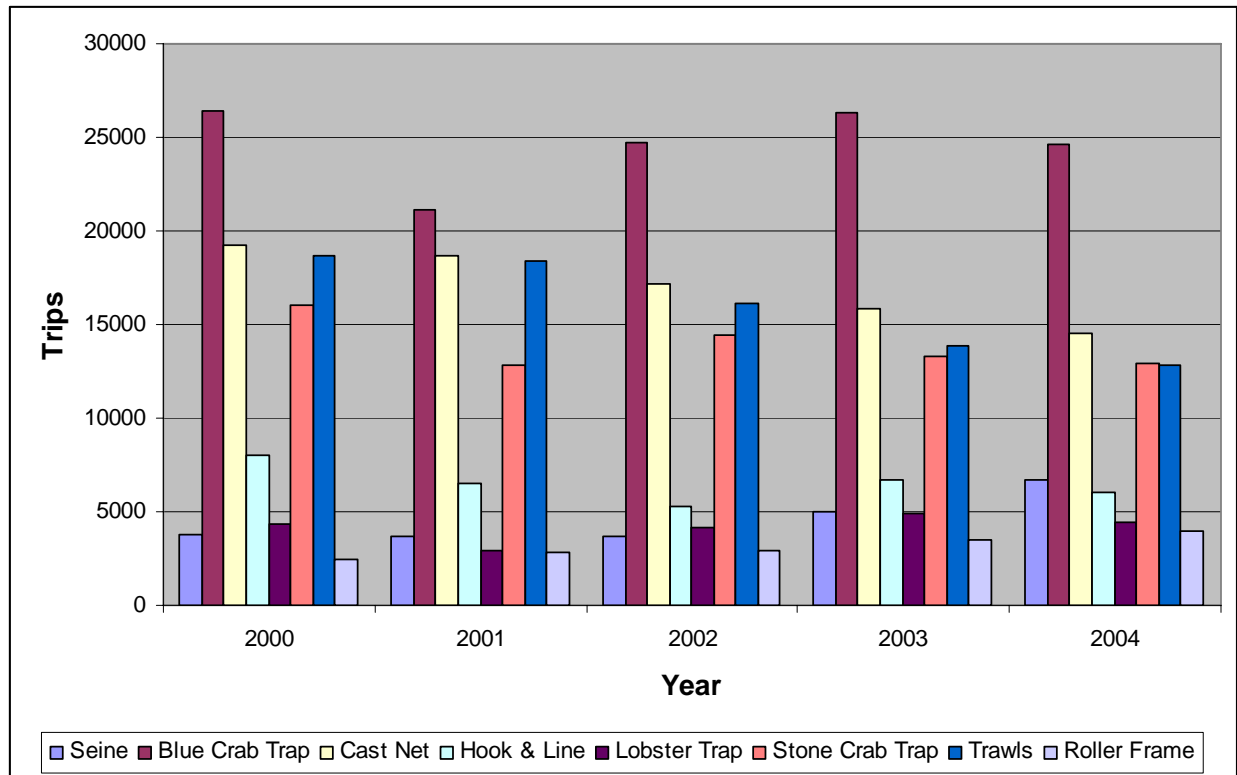


Figure 7. Number of trips by year and gear type for gears accounting for 80% of trips from 2000-2004.

Table 8. Number of trips by year and gear type from 2000-2004.

Gear Type	Year				
	2000	2001	2002	2003	2004
Bandit Rig	109	51	68	100	114
Beach/Haul Seine	3734	3705	3701	5013	6731
Blue Crab Trap	26375	21089	24672	26366	24639
Bully Net	156	137	192	311	256
Cast Net	19263	18653	17165	15858	14549
Dredge	121	210	205	246	109
Fish Trap	726	822	940	834	838
Gig	883	836	1006	1055	1134
Hand Gear	288	259	224	1562	2398
Rod & Reel	7981	6544	5272	6662	6018
Lampara Net	21	8	68	24	0
Lobster Trap	4353	2898	4126	4918	4467
Purse Seine	620	452	347	271	285
SCUBA	2316	1992	2738	2826	2697
Snorkel	388	506	427	476	549
Sponge Hook	216	341	333	362	295
Stone Crab Trap	16011	12855	14389	13316	12899
Oyster Tongs	23969	22504	18215	17415	13269
Trap, uncl.	95	143	72	99	150
Trawl, uncl.	18684	18392	16121	13880	12877
Roller Frame	2416	2784	2885	3468	3991

## **10.0 Sea Turtle Bycatch Info**

No fishery dependent or observer data is available. Some anecdotal data was acquired through the recent gear survey. One bandit rig fisher said he had never caught a turtle, but if he did, would release it alive. Another said he caught one in ten years, and it was released alive. One long line captain said he caught 24 turtles in 25 years, and that about 1/3 of them died. Another long liner said he caught four loggerhead turtles near 28 degrees 40 minutes N. latitude near a bombing range. He did not specify over what time period, but we assumed it to be in recent years because of the dates of the survey, which was based on 2003 landings, and because he remembered the location. Another long line captain said he caught and released one live loggerhead turtle over Pulley Ridge, a deep water reef west of Naples, Florida. A lobster fisher said he has had trouble with turtles on some of his buoy lines, but did not elaborate.

## **11.0 Regulations**

Since the ban on entangling nets (nets that gill a fish) from state waters was enacted in 1995 (Article X, Section 16, Florida Constitution), no entangling nets such as gill or trammel nets are allowed to be used in Florida's state waters. In addition, no non-entangling small mesh net (ex. seine, trawl) greater than 500 square feet may be used in near shore or inshore waters of the state. Near shore and inshore waters are defined as within 3 nautical miles on the Gulf coast, or within 1 nautical mile along the Atlantic coast of Florida (Florida Administrative Code (FAC) 68B-31.0035. Non-entangling nets whose net size exceeds 500 square feet must fish in state or federal waters outside of these boundaries. FAC 68B-31.004 also states that "No person shall operate or fish in any waters of the state any trawl that does not have a qualified turtle excluder device (TED) installed therein." Exceptions would be a single try net, a roller frame trawl, approved experimental gear, or trawls specifically used for harvesting of calico scallops. Provisions in this rule have also been established to prevent altering of trawl gears as to "render the TED nonfunctioning or ineffective". In addition, FAC 68A-27 (Rules Relating to Endangered or Threatened Species) specifically prohibits persons to "pursue, molest, harm, harass, capture, possess, or sell" any endangered or threatened species of marine turtle.

Rules that were not specific to turtle protection, but that may reduce impact to sea turtles are those related to the length of trap buoy lines. Rules 68B-13.008, 68B-14.005, 68B-24.006, and 68B-45.004 limit the length of buoy line floating at the surface to 15 feet for spiny lobster traps, and 5 feet for stone crab, blue crab, and black sea bass pots.

Additionally, some local laws exist that may help reduce encounters with marine turtles. FAC Chapter 68B-3.008 specifies no beach or haul seine, trawl, or traps other than for blue crab may be used in marine waters of Volusia county. Okaloosa county prohibits shrimp production in specific inland water bodies (FAC 68B-3.011). No beach or haul seine may be used by any vessel under power in waters of Hernando county (FAC 68B-3.029). In Manatee county, no seine gears are allowed in waters in and adjacent to the

Manatee River and Terra Ceia Bay (FAC 68B-3.031). Finally, FAC 68B-3.032 states that no traps other than blue crab traps may be used in marine waters of Martin county.

## **Citations**

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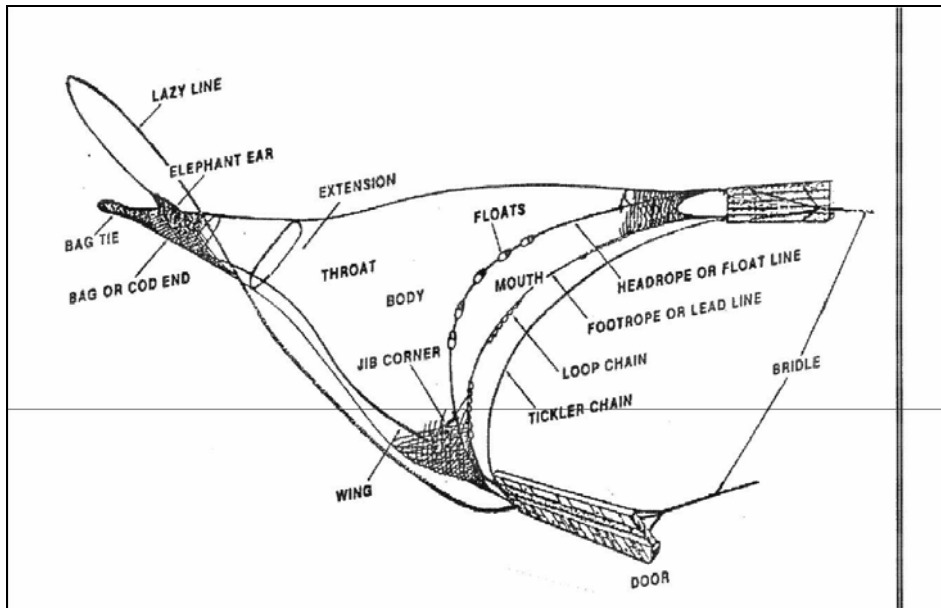
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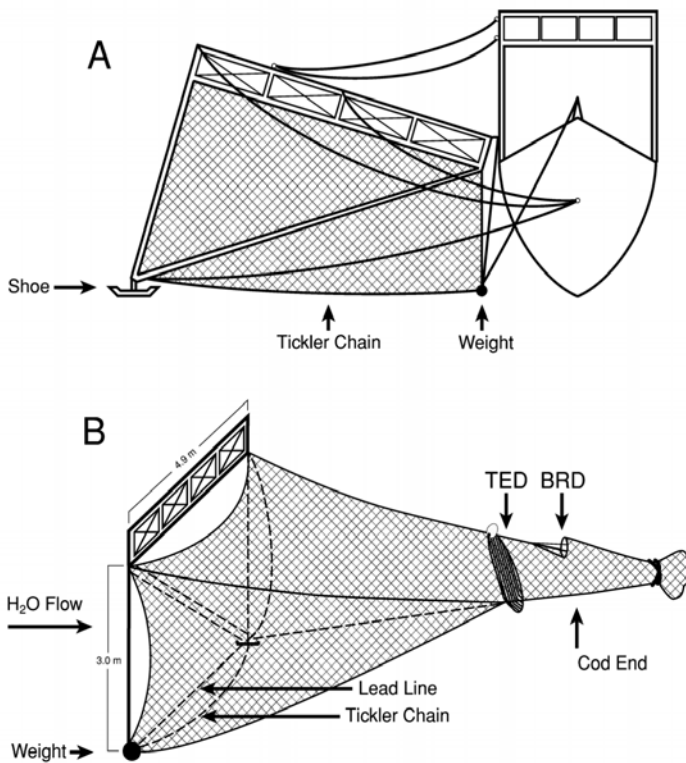
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## APPENDIX 4. TRAWLS

### 4-1. General otter trawl configuration (NMFS 1992).



### 4-2. Skimmer trawl



4-3. Roller frame trawl

